



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/674,364	09/29/2003	Michael Y. Lai	ITL.1482US (P16116)	5221
21906 7590 05/02/2007 TROP PRUNER & HU, PC 1616 S. VOSS ROAD, SUITE 750 HOUSTON, TX 77057-2631			EXAMINER TECKLU, ISAAC TUKU	
			ART UNIT 2192	PAPER NUMBER
			MAIL DATE 05/02/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/674,364

Applicant(s)

LAI, MICHAEL Y.

Examiner

Isaac T. Tecklu

Art Unit

2192

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 February 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-57 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-57 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This action is responsive to the amendment filed on 02/05/2007.
2. Claims 3-4, 25-26 and 45-57 have been amended.
3. Claims 1-57 have been examined.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-57 are rejected under 35 U.S.C. 102(b) as being anticipated by Tye et al. (US 6,226,789 B1).

As per claim 1, Tye discloses a method comprising:

generating an intermediate representation (IR) of a source program (e.g. FIG. 65B, element 884 “SOURCE INSTRUCTIONS “ and related text), where the source program includes one or more instructions for processing data in a bit field within a data structure (col. 63, 15-20 “... builds an Intermediate representation (IR) ...”);

modifying the intermediate representation to more efficiently execute the one or more instructions for processing the bit field data (col. 63, 15-30 “... then modifies IR...”); and

generating resultant code based on the modified intermediate representation (col. 63, 15-35 “... resulting instruction ... binary image ...“ and e.g. FIG. 43, CALL_FLAG 538 and related text).

As per claim 2, Tye discloses the method of claim 1, wherein modifying the intermediate representation further comprises: pre-processing the IR to perform preliminary modification of the IR (col. 2, 5-15 “... preprocessor to convert ...”) and e.g. FIG. 62C and related text).

As per claim 3, Tye discloses the method of claim 2, wherein modifying performing pre-processing further comprises:

performing data flow analysis to gather information regarding definition and usage of the bit field data (col. 1, 55-60 "... data flow analysis ..." and e.g. FIG. 57 and related text.); and generating a def/use graph to classify the information (col. 1, 55-60 "... graph representation ...").

As per claim 4 (Currently Amended), Tye discloses the method of claim 3, wherein generating a ~~def~~/use graph further comprises:

generating a ~~def~~/use graph to classify the information in relation to an associated packet (col. 3, 55-60 "... data flow analysis ...").

As per claim 5, Tye discloses the method of claim 2, wherein modifying the intermediate representation further comprises: (a) allocating a temporary variable to hold the bit field data (e.g. FIG. 23 and related text); and (b) modifying the IR so that the temporary variable is processed in accordance with the instructions (col. 63, 15-30 "... then modifies ...").

As per claim 6, Tye discloses the method of claim 5, further comprising: (c) assigning the value of the temporary variable to a memory (e.g. FIG. 47 and related text).

As per claim 7, Tye discloses the method of claim 6, further comprising: performing steps (a), (b) and (c) for a single basic block (e.g. FIG. 47 and related text).

As per claim 8, Tye discloses the method of claim 7, further comprising: identifying two or more sub-blocks within the basic block (col. 65, 20-30 "... basic bloc ..." and e.g. FIG. 47 and 48 and related text).

As per claim 9, Tye discloses the method of claim 8, wherein: steps (a), (b) and (c) are performed for each sub-block (e.g. FIG. 47 and related text).

As per claim 10, Tye discloses the method of claim 5, further comprising: determining whether all of the one or more instructions for processing the bit field data are read-after-write instructions; and performing steps (a) and (b) only if the determination is false (col. 47, 40-45 "... read write ...").

As per claim 11, Tye discloses the method of claim 6, further comprising: determining whether any of the one or more instructions for processing the bit field data are write instructions; and performing step (c) only if the determination is true (e.g. FIG. 49 and related text).

As per claim 12, Tye discloses the method of claim 6, further comprising: removing the modifications effected by steps (a), (b) and (c) upon determining that such removal is expected to provide an efficiency benefit in the resultant code (e.g. FIG. 62A, element 836 and related text).

As per claim 13, Tye discloses the method of claim 2, wherein pre-processing further comprises: disambiguating a memory reference to the bit field (e.g. FIG. 62B, element 844 and related text).

As per claim 14, Tye discloses the method of claim 1, wherein modifying the intermediate representation further comprises: modifying the IR so that multiple instructions to initialize respective bit fields of a data structure are performed with a single write to a memory (col. 63, 15-30 "... then modifies IR...").

As per claim 15, Tye discloses the method of claim 14, wherein the multiple instructions occur within a pre-defined maximal scope (e.g. FIG. 62B and related text).

As per claim 16, Tye discloses the method of claim 1, wherein modifying the intermediate representation further comprises: modifying the IR so that multiple read instructions for respective bit fields of a data structure are performed with a single read from a memory (col. 63, 15-30 "... then modifies IR...").

As per claim 17, Tye discloses the method of claim 16, wherein the multiple read instructions occur within a pre-defined maximal scope (e.g. FIG. 62B and related text).

As per claim 18, Tye discloses the method of claim 1, wherein modifying the intermediate representation further comprises: modifying the IR so that multiple write instructions to respective bit fields of a data structure are performed with a single write to a memory (col. 63, 15-30 "... then modifies IR...").

As per claim 19, Tye discloses the method of claim 18, wherein the multiple read instructions occur within a pre-defined maximal scope (e.g. FIG. 62B and related text).

As per claim 20, Tye discloses the method of claim 1, wherein modifying the intermediate representation further comprises:

determining that a first instruction, being one of the one or more instructions, indicates a bit-wise logical operation on the bit field data (e.g. FIG. 65A, element 874 and related text);

determining that a second instruction of the source program indicates a bit-wise logical operation on a second bit field within the data structure (e.g. FIG. 65A, element 876 and related text); and

modifying the IR so that the first and second instructions are performed via a single read from a memory (e.g. FIG. 65A, element 880 and related text).

As per claim 21, Tye discloses the method of claim 20, wherein the bit-wise logical operation is a bit-wise OR operation (e.g. FIG. 42 and related text).

As per claim 22, Tye discloses the method of claim 20, wherein the bit-wise logical operation is a bit-wise AND operation (e.g. FIG. 42A and related text).

As per claim 23, this is the article version of the claimed method discussed above (Claim 1), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

As per claim 24, this is the article version of the claimed method discussed above (Claim 2), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

As per claim 25, this is the article version of the claimed method discussed above (Claim 3), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

As per claim 26, this is the article version of the claimed method discussed above (Claim 4), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

As per claim 27, this is the article version of the claimed method discussed above (Claim 5), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

As per claim 28, this is the article version of the claimed method discussed above (Claim 6), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

As per claim 29, this is the article version of the claimed method discussed above (Claim 7), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

As per claim 30, this is the article version of the claimed method discussed above (Claim 8), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

As per claim 31, this is the article version of the claimed method discussed above (Claim 9), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

As per claim 32, this is the article version of the claimed method discussed above (Claim 10), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

As per claim 33, this is the article version of the claimed method discussed above (Claim 11), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

As per claim 34, this is the article version of the claimed method discussed above (Claim 12), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

As per claim 35, this is the article version of the claimed method discussed above (Claim 13), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

As per claim 36, this is the article version of the claimed method discussed above (Claim 14), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

As per claim 37, this is the article version of the claimed method discussed above (Claim 15), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

As per claim 38, this is the article version of the claimed method discussed above (Claim 16), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

As per claim 39, this is the article version of the claimed method discussed above (Claim 17), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

As per claim 40, this is the article version of the claimed method discussed above (Claim 18), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

As per claim 41, this is the article version of the claimed method discussed above (Claim 19), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

As per claim 42, this is the article version of the claimed method discussed above (Claim 20), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

As per claim 43, this is the article version of the claimed method discussed above (Claim 21), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

As per claim 44, this is the article version of the claimed method discussed above (Claim 22), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

As per claim 45, this is the compiler version of the claimed method discussed above (Claim 1), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

As per claim 46, this is the compiler version of the claimed method discussed above (Claim 2), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

As per claim 47, this is the compiler version of the claimed method discussed above (Claim 3), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

As per claim 48, this is the compiler version of the claimed method discussed above (Claim 5), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

As per claim 49, this is the compiler version of the claimed method discussed above (Claim 6), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

As per claim 50, this is the compiler version of the claimed method discussed above (Claim 14), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

As per claim 51, this is the compiler version of the claimed method discussed above (Claim 15), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

As per claim 52, this is the compiler version of the claimed method discussed above (Claim 17), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

As per claim 53, this is the compiler version of the claimed method discussed above (Claim 19), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

As per claim 54, this is the compiler version of the claimed method discussed above (Claim 20), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

As per claim 55, this is the compiler version of the claimed method discussed above (Claim 21), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

As per claim 56, this is the compiler version of the claimed method discussed above (Claim 21), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

As per claim 57, this is the compiler version of the claimed method discussed above (Claim 21), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Tye.

Response to Arguments

6. Applicant's arguments filed 02/05/2007 have been fully considered but they are not persuasive.

In the remarks, the applicant argues that:

Tye does not teach any of the steps relating to the processing of the bit field. Bit field is nowhere mentioned in the cited reference (Tye).

Examiner's response:

As a bit field is a common idiom used in computer programming to store a set of Boolean datatype flags compactly, as a series of bits, Tye illustrates processing bit field in FIG. 43. Here at col. 57, lines 25-54, states "two types of example entries in the profile statistics 17c used to determine translation units of a routine are shown. The first entry type is a TARGET ADDRESS TYPE ENTRY 532 comprising a NON_NATIVE_TARGET_ADDRESS tag 536, a CALL_FLAG 538 and a COUNT 540. Each entry of this type comprises a unique non-native address 536 which is the target of a transfer of a control. In toto, a list of these entries is used to represent all the locations to which control has been transferred at run-time as recorded by the run-time interpreter in the profile statistics. Each entry is unique from every other entry of the list. The NON_NATIVE_TARGET_ADDRESS 536 functions as an identification tag or search index when searching for an entry amongst the profile statistics, as previously described, for example when the profile statistics are organized in a hash table. The CALL_FLAG 538 is a boolean flag set to TRUE when the associated NON_NATIVE_TARGET_ADDRESS has been the target of a routine CALL. Otherwise, CALL_FLAG is FALSE. COUNT 540 is an integer representing the total number of times control has been transferred to the associated NON_NATIVE_TARGET_ADDRESS. For example, if an instruction set comprises four instructions that transfer control, COUNT represents the number of times the associated NON_NATIVE_TARGET_ADDRESS has been the target address to which control has been transferred by the four instructions" (emphasis added). Therefore Tye discloses bit field as a Boolean flag (e.g. CALL FLAG 538).

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

Art Unit: 2192

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Isaac T. Tecklu whose telephone number is (571) 272-7957. The examiner can normally be reached on M-TH 9:300A - 8:00P.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tuan Q. Dam can be reached on (571) 272-3695. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Isaac Tecklu

Art Unit 2192



TUAN DAM
SUPERVISORY PATENT EXAMINER